CLAIMS

1. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

    a probe having

    an optical fiber extending therethrough, and

    an atraumatic light-coupler in optical communication with the optical fiber, the coupler being configured to atraumatically contact the intraluminal wall;

    a light source in optical communication with the fiber for illuminating the wall; and

    a detector in optical communication with the fiber for detecting light from within the wall.

2. The spectroscope of claim **1**, wherein the probe further comprises a jacket enclosing the fiber.

3. The spectroscope of claim **2**, wherein the jacket comprises a coil-wire wound into a coil-wire jacket.

4. The spectroscope of claim **3**, wherein the jacket comprises a coil wire having a variable diameter.

5. The spectroscope of claim **1**, wherein the probe comprises a plurality of optical fibers.

6. The spectroscope of claim **1**, wherein the probe resiliently assumes a preferred shape.

7. The spectroscope of claim **6**, wherein the preferred shape comprises a bow.

8. The spectroscope of claim **6**, wherein the preferred shape comprises an arc.

9. The spectroscope of claim **6**, wherein the preferred shape comprises a portion of a catenary curve.

10. The spectroscope of claim **1**, wherein the atraumatic coupler is disposed at a distal tip of the probe.

11. The spectroscope of claim **10**, wherein the atraumatic coupler comprises a lens attached to the distal tip of the optical fiber.

12. The spectroscope of claim **10**, wherein the atraumatic coupler is integral with the optical fiber.

13. The spectroscope of claim **12**, wherein the atraumatic coupler comprises a distal tip of the optical fiber.

14. The spectroscope of claim **1**, wherein the atraumatic coupler is disposed along a side of the probe.

15. The spectroscope of claim **14**, wherein the atraumatic coupler comprises a window along a side of the probe.

16. The spectroscope of claim **15**, further comprising a diffraction grating in optical communication with the window.

17. The spectroscope of claim **14**, wherein the atraumatic coupler comprises:

    a window along a side of the probe, and

    a beam re-director providing optical communication between the window and a distal tip of the fiber.

18. The spectroscope of claim **17**, wherein the beam re-director comprises a prism.

19. The spectroscope of claim **14**, wherein the atraumatic optical coupler comprises:

a window along the side of the probe, and

a distal face of the optical fiber, the face being oriented to provide optical communication with the window.

20. The spectroscope of claim **1**, wherein the light source comprises a near infrared light source.

21. The spectroscope of claim **1**, further comprising a processor in data communication with the detector, the processor being configured to identify a vulnerable plaque on the basis of a signal provided by the detector.

22. The spectroscope of claim **1**, further comprising a cannula through which the probe passes.

23. The spectroscope of claim **22**, wherein the probe is integral with the cannula.

24. The spectroscope of claim **22**, wherein the optical fiber is embedded within the cannula.

25. The spectroscope of claim **22**, wherein the cannula comprises walls forming a channel through which the probe passes, the channel being conformal to the cannula.

26. The spectroscope of claim **25**, wherein the cannula has a tapered distal opening such that the channel has an opening facing a longitudinal axis of the cannula.

27. The spectroscope of claim **25**, wherein the cannula has a flared distal opening such that the channel has an opening facing away from a

longitudinal axis of the cannula.

28. The spectroscope of claim **1**, further comprising a hub to which a distal end of the probe is attached.

29. The spectroscope of claim **28**, further comprising a cannula through which the hub and the probe pass.

30. The spectroscope of claim **29**, wherein the probe resiliently assumes a bow shape for contacting the intraluminal wall at a point of inflection thereof.

31. The spectroscope of claim **30**, wherein the coupler is disposed at the point of inflection.

32. The spectroscope of claim **1**, further comprising a spacer attached to the probe for maintaining a preferred relative position of the probe.

33. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

a cannula having a longitudinal axis;

a plurality of probes extending through the cannula, each probe having

an optical fiber extending therethrough, and

an atraumatic light-coupler in optical communication with the optical fiber, the coupler being configured to atraumatically contact the intraluminal wall.

34. The spectroscope of claim **33**, further comprising a spacer ring attached to each of the probes for maintaining the positions of the probes relative to each other.

35. The spectroscope of claim **33**, further comprising a hub attached to a distal end of each of the probes.

36. The spectroscope of claim **35**, wherein the distal end of the probe is attached to the hub at an anchor point that is circumferentially offset from a proximal portion of the probe.

37. The spectroscope of claim **35**, further comprising a spacer ring attached to each of the probes for maintaining the positions of the probes relative to each other.

38. The spectroscope of claim **35**, wherein each of the probes resiliently assumes a bow shape having a point of inflection between the hub and the cannula.

39. The spectroscope of claim **33**, wherein each of the probes resiliently assumes a desired shape.

40. The spectroscope of claim **33**, wherein the atraumatic coupler comprises means for providing optical communication between the optical fiber and the intraluminal wall.

41. The spectroscope of claim **33**, wherein at least one of the plurality of probes is integral with the cannula.

42. The spectroscope of claim **33**, wherein the optical fiber is embedded within the cannula.

43. A method of detecting vulnerable plaque within an intraluminal wall, the method comprising:

placing an atraumatic light coupler in contact with the intraluminal wall;

passing light through the intraluminal wall by way of the atraumatic light coupler;

receiving light from within the intraluminal wall by way of the atraumatic coupler; and

providing the received light to a processor for analysis to identify the presence of a vulnerable plaque.

44. The method of claim **43**, wherein placing an atraumatic light coupler in contact with the intraluminal wall comprises placing a distal end of a probe in contact with the intraluminal wall.

45. The method of claim **43**, wherein placing an atraumatic light coupler in contact with the intraluminal wall comprises placing a side of a probe in contact with the intraluminal wall.

46. A spectroscope for detecting vulnerable plaque within a lumen defined by an intraluminal wall, the spectroscope comprising:

a probe having

an optical fiber extending therethrough, and

means for atraumatically contacting the intraluminal wall, the contacting means including means for providing optical communication with the intraluminal wall;

a light source in optical communication with the fiber for illuminating the wall; and

a detector in optical communication with the fiber for detecting light from within the wall.

47. The spectroscope of claim **46**, wherein the means for atraumatically contacting the intraluminal wall comprises a rounded surface at a distal tip of the probe.

48. The spectroscope of claim **47**, wherein the rounded surface comprises a surface of a lens attached to the fiber.

49. The spectroscope of claim **48**, wherein the means for providing optical communication comprises the lens.

50. The spectroscope of claim **47**, wherein the rounded surface comprises a surface of the fiber.

51. The spectroscope of claim **43**, wherein the means for providing optical communication comprises the fiber.

52. The spectroscope of claim **46**, wherein the means for atraumatically contacting the intraluminal wall comprises a side-window along a side of the probe.

53. The spectroscope of claim **52**, wherein the means for providing optical communication comprises a reflective surface in optical communication with the side-window and with a face of the fiber.

54. The spectroscope of claim **52**, wherein the means for providing optical communication comprises an angled face of the fiber.

55. The spectroscope of claim **52**, wherein the means for providing optical communication comprises a diffraction grating in optical communication with the side-window and with the fiber.